Iowa STEM Monitoring Project

Preliminary Findings

STEM Executive Committee Meeting

July 11, 2013

RISE
RESEARCH INSTITUTE FOR STUDIES IN EDUCATION

THE UNIVERSITY OF IOWA

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

University of Northern Iowa
Center for Social and Behavioral Research

Iowa STEM Monitoring Project

Objective: Systematically observe a series of defined metrics and sources to examine changes regarding STEM education and economic development in Iowa.

Governor's STEM Advisory Council

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Iowa STEM Indicators System (ISIS)

System to track publicly available data at the national, state, and regional levels

18 indicators in 4 areas:
1. K-12 student preparation
2. Achievement/interest
3. College completions
4. Employment

Data sources:
- Department of Education
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- Census Bureau
- Iowa Workforce Development
- Scale-up programs
- Iowa Testing
- NAEP/ACT

Statewide Survey of Public Attitudes Toward STEM

Annual survey of Iowans regarding attitudes toward and awareness of STEM education and economic development

Special sections for parents of K-12 children (ages 4-11 and ages 12-19)

Year 1 data collection with 2,010 Iowans

Created to allow for comparisons with other state/regional/national studies

Statewide Student Interest Inventory

Annual assessment of Iowa K-12 student interest in STEM topics

Administered with regular Iowa Assessments in schools across the state

8 STEM interest items in 2 versions for older and younger students

Interest will be compared across demographic and geographic lines

Student interest and achievement will be compared

Scale-Up/ Regional

Regional perspective on STEM programming and student involvement

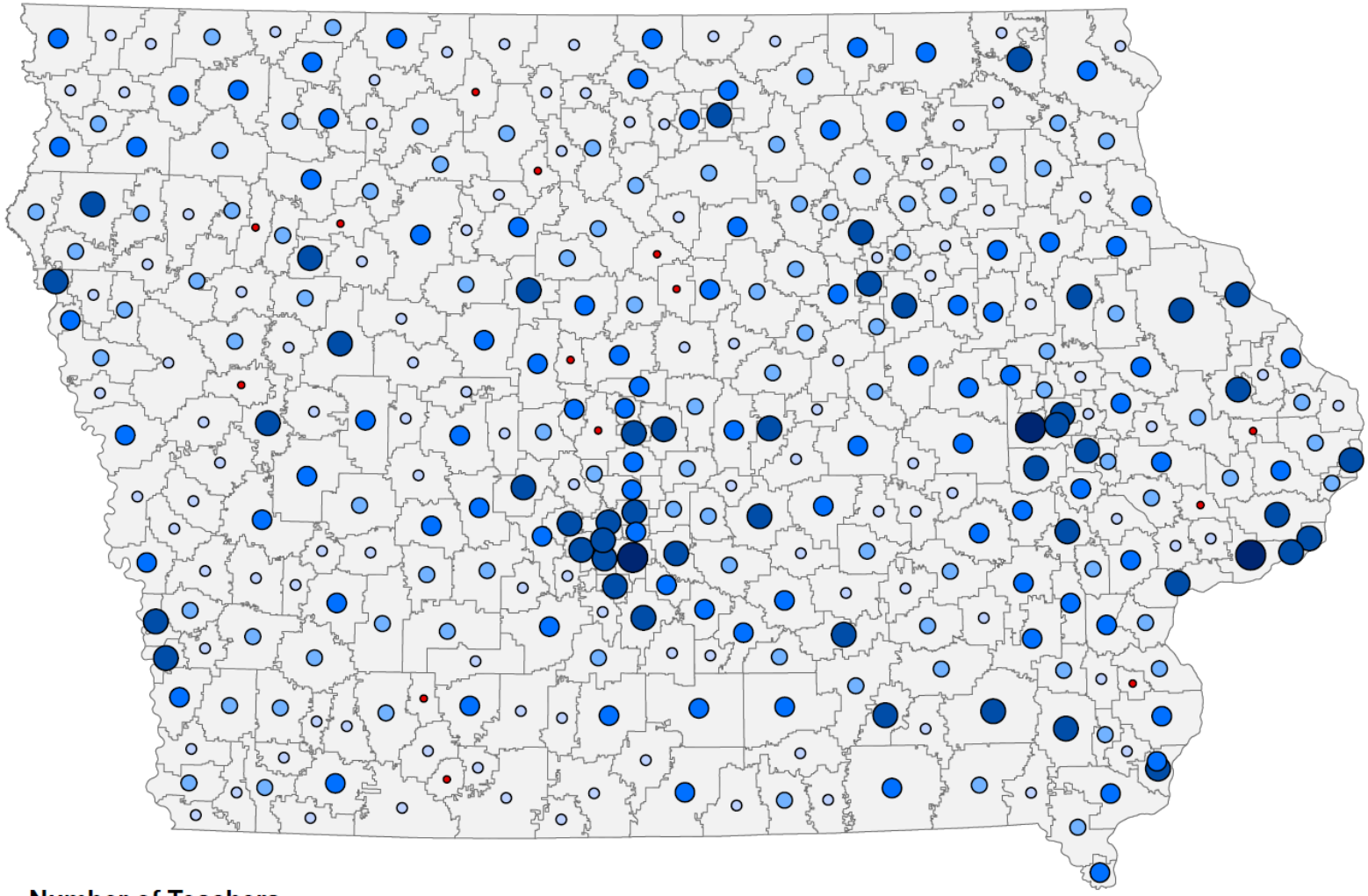
Over 800 local education agencies (LEA) participating in 12 Scale-Up programs

Each LEA reports about local Scale-Up implementation process;

Assessment of STEM interest among student participants in Scale-Up programs

Assessment of STEM achievement among student participants in Scale-Up programs

STEM Indicator: Iowa Teachers by District with Endorsement in Science (2008-2009)



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Survey of Public Attitudes Toward STEM

- Methods
  - 3 sampling strata: general population, parents of 4-11, parents of 12-19
  - Dual-frame: cell phones and landlines
  - Data weighted to represent the adult population of Iowa

- Year 1
  - July – September, 2012
  - 2,010 completed interviews

- Year 2
  - June – August, 2013
  - 500 completed interviews & counting!

Survey of Public Attitudes Toward STEM (Year 1, 2012)

Among all respondents…

Only 26%

of Iowans have heard of the acronym STEM

Recall is highest among…

- Iowans with a 4-year degree or higher **(47%)**
- Iowans with children in school **(35%)**

Although STEM "brand awareness" may be low…

65%

of Iowans have heard *something* about improving math, science, technology, and engineering education in the past month

Survey of Public Attitudes Toward STEM (Year 1, 2012)

Compare parent and <u>student data…</u>

44%

Of parents of children ages 12-19 said their children showed a lot of interest in STEM subjects.

Overly optimistic?

Very interested in…	6th grade	12th grade
Science	38%	26%
Technology	50%	29%
Engineering	32%	18%
Math	32%	13%
STEM Career	46%	34%

Source: ITEST Interest Inventory

Survey of Public Attitudes Toward STEM (Year 2, 2013)

- Changes in 2013
  - More questions about engineering
  - STEM in informal settings/alternative venues (e.g. Girl Scouts, libraries)
  - Use of technology at home to support learning
  - Questions that align with intended objectives of Public Awareness Campaign, e.g. urgency/need for STEM professionals/jobs

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Statewide Student Interest Inventory

- STEM Interest Inventory added to the Iowa Assessment exam conducted by Iowa Testing.
- Compared all students statewide to Scale-Up student participants on their ITEST Interest and Achievement scores.
- Statewide = **241,957** students
- Scale-Up participants = **4,492** students

ITEST: Science Scores

Statewide vs. Scale-Up Student Scores in Science

Grade	State Science	Scale-Up Science	Difference
3	188.07	194.11	+ 6.04
4	207.43	217.06	+ 9.63
5	217.66	227.41	+ 9.75
6	230.02	234.77	+ 4.75
7	244.05	257.30	+ 13.30
8	259.39	262.20	+ 2.81
9	282.30	292.95	+ 10.70
10	294.01	308.68	+ 14.70
11	299.28	323.32	+ 24.00

Data source: Iowa Testing

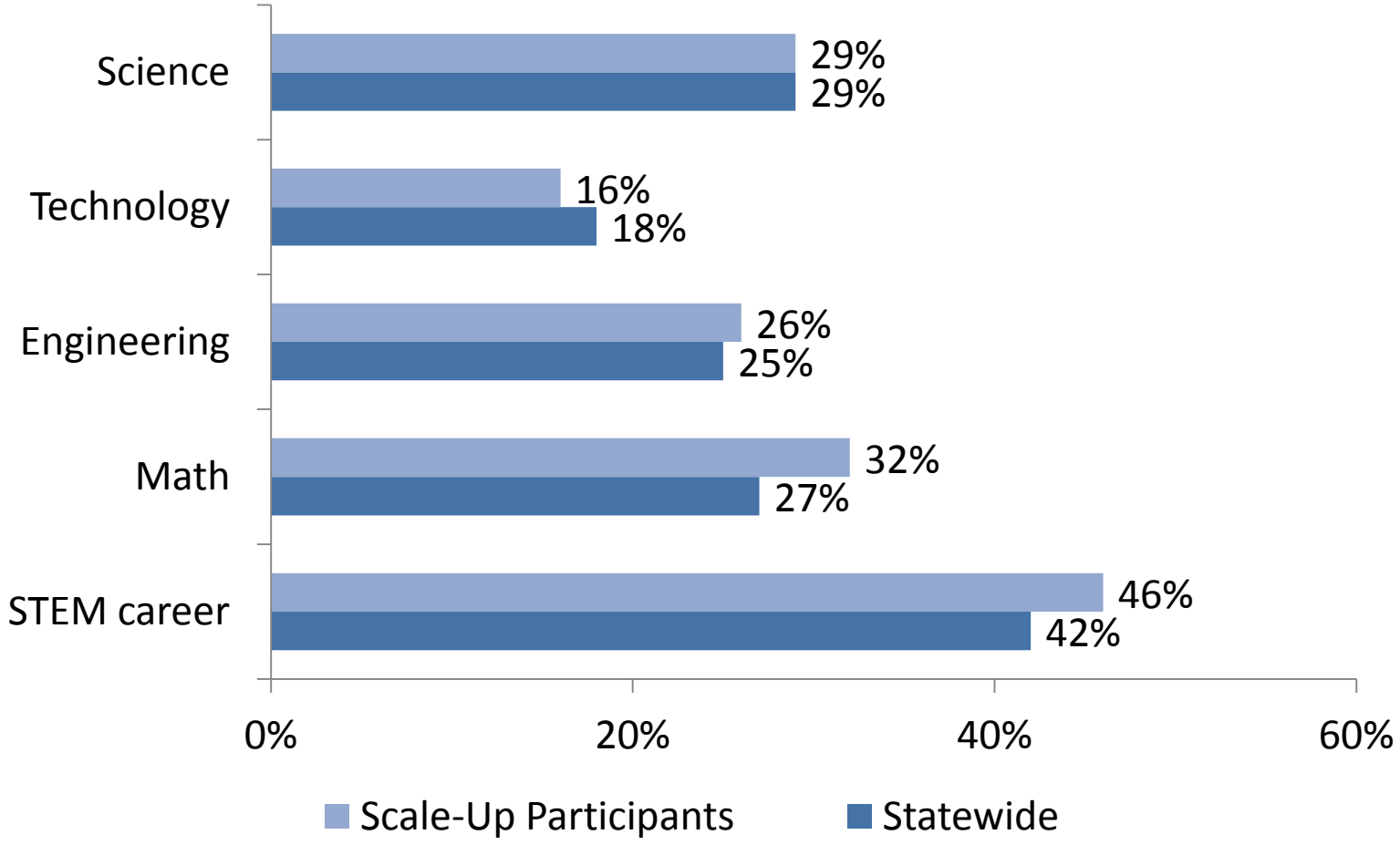
ITEST: Math Scores

Statewide vs. Scale-Up Student Achievement in Math

Grade	State Math	Scale-Up Math	Difference
3	185.44	191.02	+ 5.58
4	201.51	210.23	+ 8.72
5	216.18	224.02	+ 7.84
6	226.52	231.50	+ 4.98
7	242.30	256.98	+ 14.7
8	255.45	258.29	+ 2.84
9	273.59	283.00	+ 9.41
10	284.00	297.63	+ 13.60
11	291.60	312.46	+ 20.90

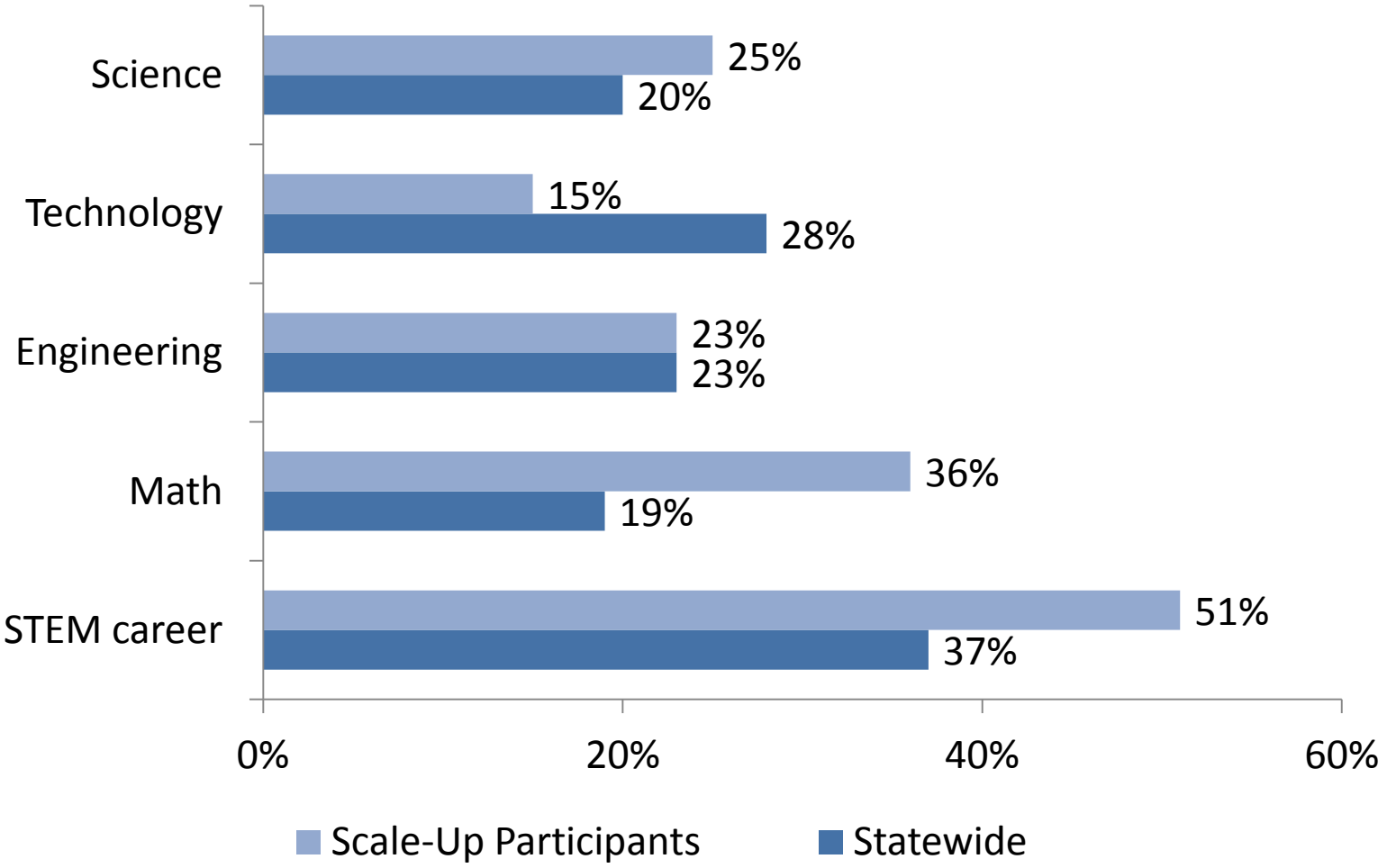
Data source: Iowa Testing

Student interest in STEM: Grades 6-8 “very interested”



Data source: Iowa Testing
(Scale-Up participants matched to scores on Iowa Assessments “Interest Inventory”)

Student interest in STEM: Grades 9-12 “very interested”



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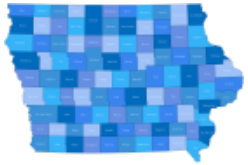


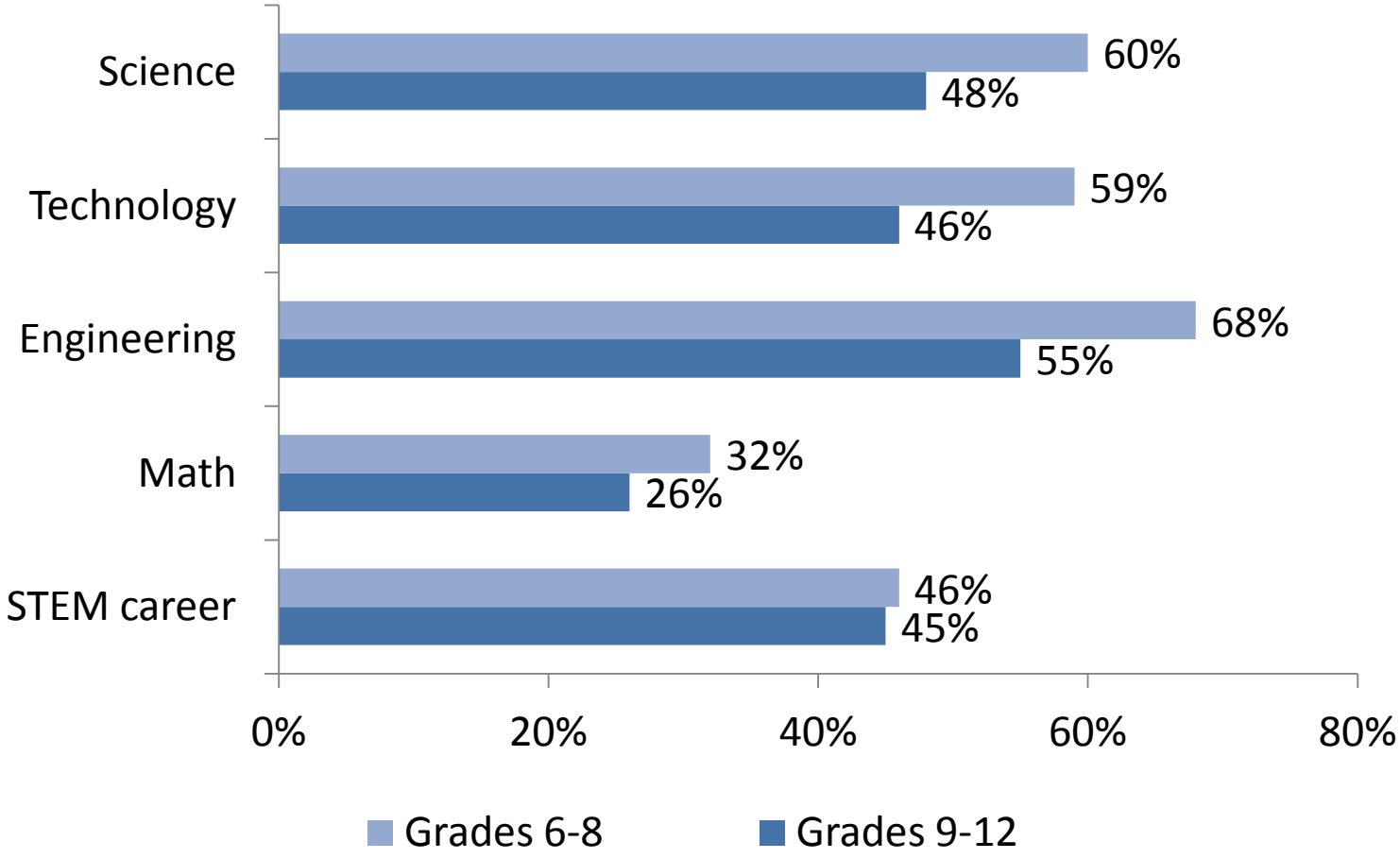
Scale-Up Student Survey

- Scale-Up participants were given a 7-item questionnaire to gauge interest in STEM.

- Compared to the beginning of the (semester/program/etc.), are you more interested, just as interested, or less interested now in:
  - Science?
  - Math?
  - Computers and technology?
  - in designing, creating, and building machines and devices (also called engineering)?
  - someday having a job that uses skills in science, technology, math, or engineering?

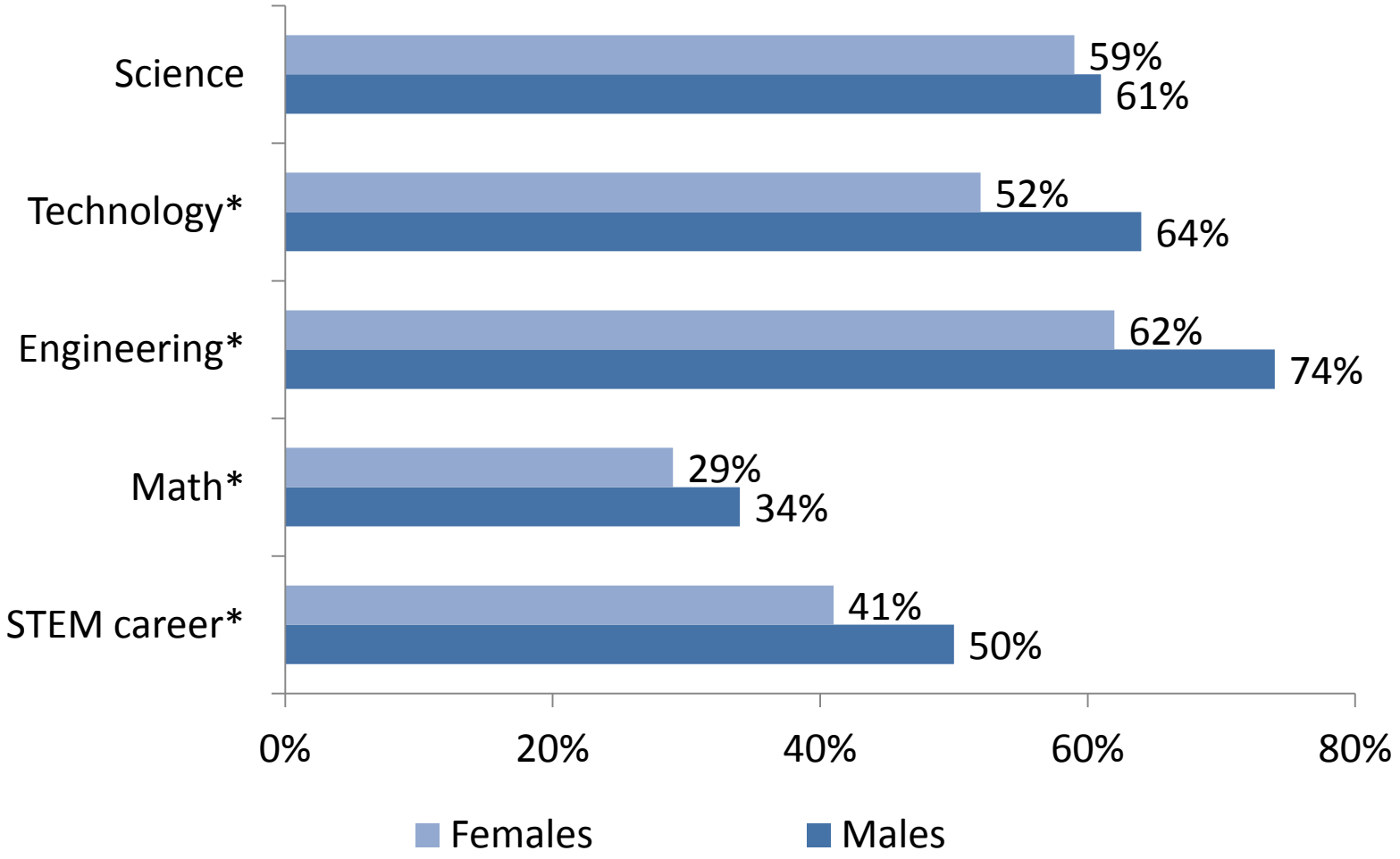
- **7,729** completed student questionnaires

Student interest in STEM: Grades 6-8 vs 9-12 “very interested”



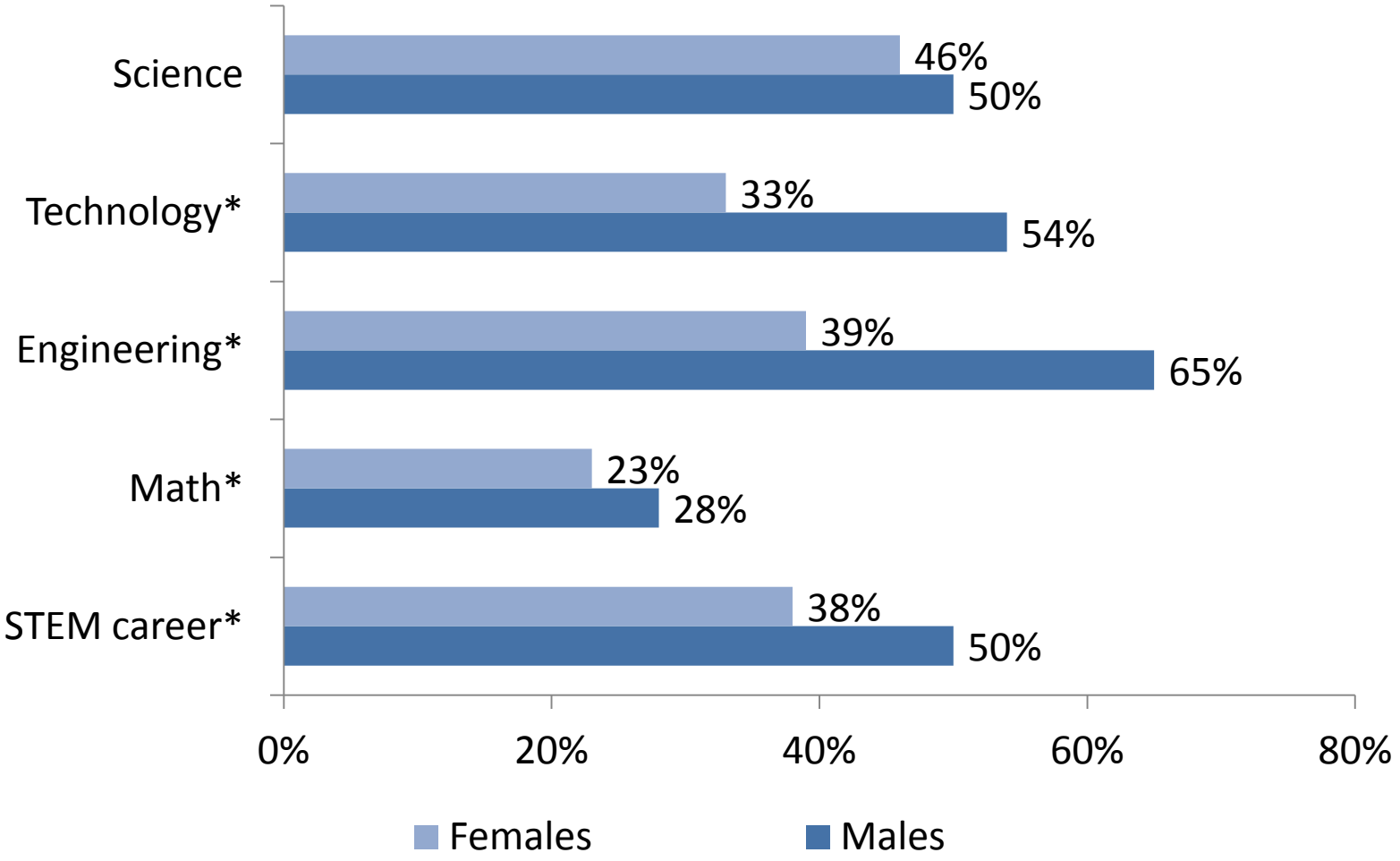
Data source: Scale-Up student survey

Student interest in STEM by Gender: Grades 6-8 “more interested”



Data source: Scale-Up student survey
*statistically significant difference

Student interest in STEM by Gender: Grades 9-12 “more interested”



Data source: Scale-Up student survey
*statistically significant difference

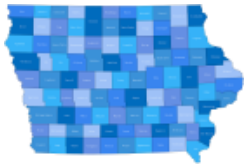
Interest in STEM: % “more interested” by program

= Near average

= Above average

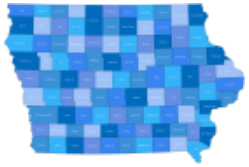
	S	T	E	M	Careers
Total	**60%**	**60%**	**67%**	**39%**	**50%**
A World in Motion (2,796)	62%	58%	66%	44%	49%
Corridor STEM Initiative (1,404)	68%	67%	72%	47%	51%
KidWind (1,138)	59%	50%	63%	33%	46%
FIRST Lego League (984)	65%	73%	78%	39%	59%
FREE (490)	48%	38%	49%	22%	34%
FIRST Tech Challenge (395)	49%	74%	77%	28%	63%
HyperStream (174)	47%	72%	65%	28%	46%
Project HOPE (117)	37%	32%	33%	25%	42%
State Science + Tech Fair (84)	41%	45%	50%	18%	32%
PEERS (62)	60%	58%	59%	27%	64%

Data source: Scale-Up student survey



Scale-Up Teacher/Leader Implementation Report

- **283** programs reported participant and outcomes data. All involved K-12 students.
- **10,046** participants—8,829 students, 421 parents, 425 teachers, 371 others.
- **2/3** of student participants were male.



Scale-Up Teacher/Leader Implementation Report

Teacher/Leader Observations of Scale-Up Impact (2012-13)

84% Increased awareness in STEM topics

87% Increased interest in STEM topics

58% Increased awareness in STEM career opportunities

51% Increased interest in STEM career opportunities

41% Increased achievement in STEM topics

36% Increased interest in STEM in college

25% Established partnerships with local businesses

Data source: Scale-Up Teacher/Leader Implementation Report